Name:

at1124exam: Radicals and Squares (v914)

Question 1

Simplify the radical expressions.

$\sqrt{18}$ $\sqrt{20}$ $\sqrt{27}$

$\sqrt{3 \cdot 3 \cdot 2}$ $\sqrt{2 \cdot 2 \cdot 5}$ $\sqrt{3 \cdot 3 \cdot 3}$

$3\sqrt{2}$ $2\sqrt{5}$ $3\sqrt{3}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-10)^2+3}{6} = 14$$

First, multiply both sides by 6.

$$(x-10)^2+3 = 84$$

Then, subtract 3 from both sides.

$$(x-10)^2 = 81$$

Undo the squaring. Remember the plus-minus symbol.

$$x-10 = \pm 9$$

Add 10 to both sides.

$$x = 10 \pm 9$$

So the two solutions are $x = 19$ and $x = 1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 10x = 96$$

$$x^2 - 10x + 25 = 96 + 25$$
$$x^2 - 10x + 25 = 121$$
$$(x-5)^2 = 121$$
$$x - 5 = \pm 11$$
$$x = 5 \pm 11$$
$$x = 16 \quad \text{or} \quad x = -6$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 3x^2 + 24x + 39$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 8x) + 39$$

We want a perfect square. Halve 8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 8x + 16 - 16) + 39$$

Factor the perfect-square trinomial.

$$y = 3((x+4)^2 - 16) + 39$$

Distribute the 3.

$$y = 3(x+4)^2 - 48 + 39$$

Combine the constants to get **vertex form**:

$$y = 3(x+4)^2 - 9$$

The vertex is at point $(-4, -9)$.